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THE AIR FORCE IN SPACE

Fiscal Year 1968

Part II

by

Gerald T. Cantwell

OFFICE OF AIR FORCE HISTORY

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[redacted]

FOREWORD

The Air Force in Space, Fiscal Year 1968, Part II, is being published separately for security reasons, enabling wider distribution for the five chapters of Part I of the history. The two chapters below examine space surveillance issues, early missile warning, nuclear detection satellites, and other projects that might assist the United States to defend itself against enemy ballistic missile or fractional orbital bombardment system attack. For background information on these programs and systems, the reader should consult Part II of the fiscal year 1967 space history.

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Part II

VI. SPACE SURVEILLANCE ISSUES

On 18 May 1967, the Air Force Systems Command (AFSC) submitted the proposed system package plan for the program.[3]

*The original contract negotiated in December 1966 called for a launch in January 1970, but subsequent fund reductions necessitated rescheduling to the later date.

[redacted] No action was taken on the AFSC plan during the summer of 1967 pending a review of certain surveillance questions by the Air Force and the Office of the Secretary of Defense (OSD).

[redacted] The Russian bombardment system, which could release a warhead at any point during its first orbit, constituted a new problem for U.S. defense forces. The Soviets could launch FOBS so as to approach the United States from the south, where the nation had no detection system. If launched on a low-northern trajectory, it could penetrate between the fans of the Ballistic Missile Early Warning System (BMEWS) radars at Clear, Alaska and Thule, Greenland.

[redacted] Although civilian officials publicly belittled FOBS as a real danger to the country, the Joint Chiefs of Staff (JCS) and Air Force believed the system could be used as a first-strike weapon against U.S. strategic forces, especially the bomber bases of the Strategic Air Command (SAC).

[redacted] However, Secretary of the Air Force Harold Brown believed that the combination of BMEWS and the 440L forward scatter over-the-horizon (OTH) radar, then under development, could give adequate warning. Separate sets of instructions later were sent to AFSC. The Air Staff directed the command to look into the possibilities of accelerating [redacted] development, while Dr. Alexander H. Flax, Assistant Secretary of the Air Force for Research and Development, asked AFSC, along with SAC and Aerospace Defense Command (ADC), to reassess the FOBS threat and possible counters to it. At the same time, Secretary of Defense Robert S. McNamara asked the JCS for a formal paper on the issue.[4]

[redacted] On 10 August 1967, after the major air commands confirmed both the danger of FOBS and the

[redacted] [redacted] A month later, AFSC briefed a joint session of the Air Staff Board's Strategic, Air Defense, and Space Panels on its various findings. The command said it was feasible to speed development by a full year and provide a FOBS warning capability by June 1969.

AFSC officials also reported that a further analysis of the OTH system (Program 440L) indicated it could contribute to FOBS detection.[6]

[redacted] Before the Air Force Secretariat and OSD could respond to the program change request, another matter had to be cleared up: Would the Vela satellite program retain its role as the Defense Department's primary nuclear test detection system,

Jointly conducted by the Department of Defense (DOD) and the Atomic Energy Commission (AEC) since 1962, Vela was one of the most successful satellite projects in which the Air Force had ever been involved. Under the executive control of the Advanced Research Projects Agency (ARPA) and the technical management of the Air Force, it had produced four successful launches of two satellites each in October 1963, July 1964, July 1965, and April 1967. In addition to achieving their developmental objectives by

the eight satellites also provided useful space radiation monitoring and solar forecasting data to Air Force users.[8]

[redacted] As matters stood in August 1967, the last Vela R&D launch was scheduled for fiscal year 1969. On the 26th, Secretary McNamara requested the Air Force to submit a plan for an operational nuclear test detection system. The recommended system might be based on Vela, or a combination of the two. Forwarded to OSD on 5 October 1967, the Air Force plan described a system of four earth-oriented spacecraft similar to the Vela V operational prototypes. Assuming that both the Vela V satellites and the new ones would operate for three years, the Air Force said it expected to achieve at least 80 percent

worldwide coverage through 1971. The operational satellites' payloads would include X-ray, gamma ray, and neutron detectors to diagnose nuclear explosions occurring in the upper atmosphere and deep space. Optical and electromagnetic pulse detectors would cover nuclear events below the upper atmosphere.[9]

[redacted] The Air Force plan, although forwarded to OSD to meet its deadline, did not reflect a firm USAF position. The Air Staff and AFSC were still considering other options.

Another was to launch the back-up Vela satellites to bridge the gap between Vela V

[redacted] During the first week of November 1967, Secretaries Brown and McNamara reached basic agreement on most of these matters. On 6 November, Secretary McNamara rejected acceleration of

At the same time, he agreed to the Air Force's proposals to accelerate development of the 440L OTH radar system.[11]

[redacted] On 11 January 1968, Secretary McNamara announced two more decisions He advised Secretary Brown that an

This decision meant that the Vela program would end when its Launch V satellites quit working.[12]

[redacted] That same day, Paul H. Nitze, Deputy Secretary of Defense, directed the Air Force to maintain the currently planned R&D schedule leading to the launch of the first of three satellites in June 1970.* He believed that the costs

*In the interim, Secretary Brown had proposed further augmentation of [Memo ([redacted]), Brown to SecDef, 14 Nov 67, subj: Progs 949 and 440L.]

of deploying additional satellites outweighed the benefits. However, he urged the Air Force to be prepared to reschedule the R&D launches if program objectives were achieved by either the first or second launch. Secretary Nitze also authorized the Air Force to prepare a plan to transition from R&D to operational status, with special emphasis on overall system survivability and user compatibility.[13]

In addition, Mr. Nitze requested the Air Force and the Army to jointly determine whether any special spaceborne sensors might help the If they decided that such a sensor was needed, they were to prepare a development plan providing for its eventual incorporation into the satellite. On 28 February, General Hedrick directed AFSC to take these actions and early in April the Acting Vice Chief of Staff ordered all the operating commands to assist Systems Command.*[14]

By this time, the ODDR&E staff had completed the Development Concept Paper (DCP).+ Secretary Flax concurred for the Air Force on 12 February 1968 and Mr. McNamara's successor, Secretary of Defense Clark M. Clifford, approved the paper on 21 March. Two weeks later, Dr. John F. Foster, Jr., Director of Defense Research and Engineering requested the Air Force to submit a technical development plan

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Even before Secretary Nitze's injunction for Army/Air Force cooperation in this area, Lt. Gen. Joseph R. Holzapple, Deputy Chief of Staff/R&D, on 27 December wrote his Army counterpart, Lt. Gen. A. W. Betts, proposing a meeting between the two to discuss how best to achieve interface between General Betts was receptive and the two agreed to meet on 29 February 1968 [Ltr (), Betts to Holzapple, 31 Jan 68, subj: Interface].

+The development concept paper, a management innovation introduced in the fall of 1967, was designed to help the Secretary of Defense make decisions on major programs throughout their development. The paper presented the continuing rationale, military and economic consequences, and risks involved.

and program change request reflecting the guidance contained in the DCP with regards to development, production, and operational phases of the program.[15]

[redacted] The concept paper noted, as AFSC had, that while the primary purpose of the system was to provide early warning of a strategic missile attack, its basic sensors could also collect data useful for other tasks. It could help the

[redacted] Mr. McNamara's 6 November decision authorizing deployment of a FOBS readout station necessitated some reassessment of the Block I R&D system. On 31 January 1968, after reviewing AFSC's plans for the ground system, Secretary Flax posed several questions to the Air Staff. He requested assurance that locating a sophisticated data processing facility overseas was economical and that the selected system itself would be the least expensive. He also inquired about the possibility of procuring the ground subsystem through an industry-wide competition.

[redacted] On 8 April, General Holzapple assured Dr. Flax that it was more economical to locate the data processing facilities overseas. With respect to procurement, he noted that the time required to solicit industry bids for both the readout and

data processing portions of the system might jeopardize attainment of operational status by June 1970. The primary problem would be developing software, rather than hardware, which required that a new contractor have a complete understanding of sensor systems. General Holzapple promised to continue to monitor these matters and to alert Dr. Flax to any scheduling problems that competitive procurement might cause.[17]

[redacted] By the end of May 1968, the Air Staff and Dr. Flax's Deputy for Requirements, Dr. Michael I. Yarymovych, had agreed on proposed procurement options that would be presented to the Assistant Secretary. Dr. Flax could choose between limited competition during the program definition phase and competitive procurement on all elements of the ground station except for design, software, and some hardware for the data processing facility. He also suggested that Dr. Flax be presented another program option.

Although some disadvantages would accrue, Dr. Yarymovych thought they might be acceptable. Consequently, he suggested that Dr. Flax have the opportunity to consider a restructured program of elliptical orbit and a single ground station in the central United States. Otherwise, he still had the choice of the current program calling for synchronous orbit and oversea data relay or data processing facility with provision for possible transition to a U. S. facility and elliptical orbit later.[18]

SOS-70

[redacted] As noted elsewhere in this study,* AFSC and ADC conducted a mission analysis--

On 5 June 1968, the two commands briefed a joint meeting of the Air Staff Board's Space, Strategic, and Aerospace Defense Panels on the results of their work.[19]

*See Part I, pp 3-4.

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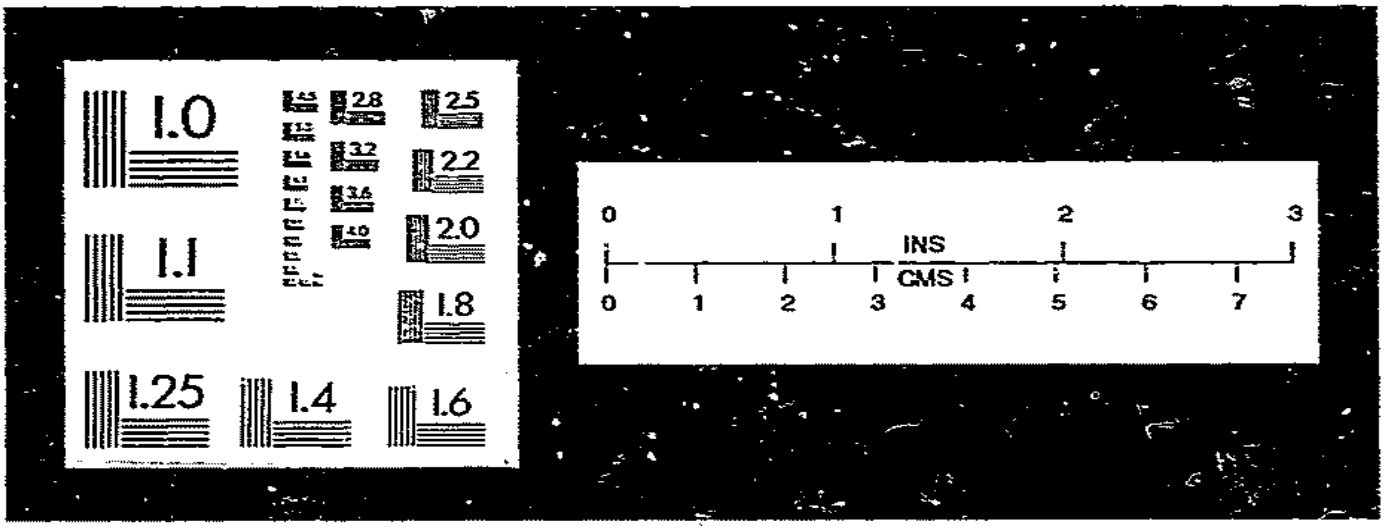

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[redacted] In such an environment, the nation needed a broader range of strategic options and its surveillance network had to do more than simply provide tactical warning of a mass raid. It must supply sufficient information to aid battle managers (the National Command Authorities and the Unified and Specified Commanders) assess the situation and carry out appropriate actions. Existing and programmed surveillance systems were not only very costly but could not adequately fill battle management information needs.

[redacted] The working group identified a mix of systems that it deemed essential to the wartime mission but that would also perform significant peacetime functions.

a communication and control system, and a Space Defense Computation Center. For peacetime augmentation for threat assessment, the group reported that existing Spacetrack system radars and a spaceborne inspector would be adequate.

[redacted] Exploitation of this data would require a survivable global communication net connecting each sensor to the Space Defense Computational Center. The necessary global communication coverage could be provided by three relay satellites with an earth angular separation of approximately 120°.

[redacted] Following the AFSC/ADC briefing, the Air Staff Board panels recommended that the findings be incorporated into such related USAF studies as STRAT-70 and the Missile and Space Defense Analysis for assimilation by the Missile and Space Defense Coordinated Action Plan (CAP).*[21]

*The Defense CAP is discussed on pp 16-17.

VII. MISSILE AND SPACE DEFENSE

[redacted] [redacted] Although Dr. Foster did not sign the death certificate until 3 February 1968, the Air Force's [redacted] had been effectively eliminated five months before when the administration decided to deploy the "thin" antiballistic missile system.* Also contributing to the program's demise was the emergence of the Soviet FOBS as a new threat to U. S. security plus the recognition by top DOD officials of the potential contribution that [redacted] long wave infrared (LWIR) technology might make to ballistic missile defense.

[redacted] [redacted] The Air Force originally conceived [redacted] In submitting a preliminary and then a revised proposed system package plan to OSD, the Air Force requested approval to demonstrate [redacted] On 1 June Dr. Foster gave qualified approval to the program. However, any flight demonstrations [redacted] were to be coordinated with an ARPA program aimed at discovering the most effective way to [redacted] On the basis of Dr. Foster's guidance, the Air

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*On 18 September 1967, Secretary McNamara announced the decision to deploy the $5 billion Sentinel missile defense system against the threat of a Chinese Communist ICBM attack. The "thin" system included a mixture of long-range Spartan missiles to protect the whole nation and short-range Spring missiles to defend its strategic missile force. [The Washington Post, 19 Sep 67.]

[redacted] Never intended to be anything but an interim system, Program 437 became operational in May 1964. It employed [redacted] Thor missiles to give the nation a modest defense against satellites in certain orbits. [Rprt [redacted], Aerospace Def Pnl Mtg 68-5, 19 Mar 68.]

Force on 13 June 1967 issued a letter contract to Ling-Temco-Vought to initiate Phase II development activity.[1]

[redacted] The program, however, did not survive another year. Successive OSD actions ultimately halved 1968 funds and left none for 1969. In an ironic turn of events, by January 1968 OSD's only interest in was in its LWIR technology. The Air Force had asked for the opportunity to show that its would also be effective against through application of this long wave infrared guidance technology. ODDR&E agreed that this was probably true but decided that, if LWIR were to be exploited for ballistic missile defense, it should be done within the context of the Army's recently approved Sentinel system.[2]

[redacted] During the latter days of January, the Air Staff desperately tried to save emphasizing the LWIR guidance technology and capability. But on 3 February Dr. Flax advised the Chief of Staff that ODDR&E would not support because of funding problems. Although Dr. Foster had intended to cancel the program element outright, Dr. Flax persuaded him to reinstate $1 million to allow some work on the technology.[3]

[redacted] Formal confirmation was received from DDR&E the same day. Accepting Dr. Flax's arguments, Dr. Foster agreed that, although budget decisions required the project's cancellation, a minimum basic technology program should be carried on since its technology had several potential applications to both Sentinel and Nike-X. Its revised goal was to demonstrate the feasibility of applying a throttleable, liquid rocket maneuverable engine, LWIR guidance, and to the Army programs.[4]

[redacted] Since other studies in optical measurements and of an improved Spartan would not be completed until

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*See further discussion below, pp 14-15.

June, final decisions on the oriented project could not be made. Pending completion of the studies, Dr. Foster directed the Air Force to cancel as a numbered program and to cooperate with the Army in demonstrating that midcourse LWIR could be incorporated into Sentinel and Nike-X. Dr. Foster promised that the remainder of deferred funds would be released for application to the new technology effort. Moreover, the Army's 1969 budget would include $10 million for transfer to the Air Force for continuation of work on LWIR sensors.

[redacted] On 21 March 1968, after further discussion with ODDR&E, the Air Staff directed AFSC to prepare a plan to demonstrate the feasibility of LWIR A secondary objective was the collection of optical measurements. The project was redesignated the Defense Subsystem Development and Demonstration Program, also referred to by its short title, "Special Defense Program."[5]

[redacted] The new AFSC plan, received by the Air Staff in late April, was discussed on 2 May 1968 with ODDR&E representatives. It called for two Johnston Island launches of Thor-boosted payloads which could attempt to intercept targets launched from Vandenberg AFB into the Kwajalein area. One of the targets would be a clean reentry vehicle; the other would be accompanied by chaff. A third vehicle would be prepared for ground testing, but could be refurbished for flight if necessary.[6]

[redacted] OSD officials suggested that the Air Force include an additional option. They proposed first launching two emasculated vehicles--with maneuvering engine,
-against targets of opportunity. This would provide a relatively inexpensive verification of the search and track capability of the LWIR guidance subsystems. Addition of these launches, however, would delay demonstration of the complete vehicle for a year. On 8 June 1968, the Chief of Staff submitted the revised plan to Dr. Flax's office, where it was still being considered at the end of the fiscal year.

[redacted] The Air Staff effort described above to augment had been part of

a broader attempt begun in March 1966 to define a ballistic missile defense mission for the Air Force. In fiscal year 1967 AFSC investigated several promising approaches, some of which would exploit space technology. The command completed a ballistic missile defense mission analysis in May 1967 which concluded that optics--especially LWIR--offered promising application for midcourse discrimination against radar penetration aids. The command recommended additional studies be undertaken in 1968 to define an active defense system using multiple homing interceptors and to further define an LWIR aircraft or spacecraft system to provide midcourse discrimination. AFSC's recommendations coincided with general DOD-wide interest in LWIR applications to the midcourse discrimination problem.[7]

[redacted] In July 1967, ARPA directed both the Army and the Air Force to identify an optical measurements program bearing on a midcourse ballistic missile defense capability. Concurrently, AFSC established a focal point within its Space and Missile Systems Organization (SAMSO) to direct the command's activities leading to this capability. Gen. James Ferguson, AFSC commander, thought that the earlier mission analysis (performed by SAMSO) provided a sound foundation for further study and technology effort. Sharing the Air Staff concern that a bias existed within ARPA and ODDR&E to confine service responsibilities for ICBM defense to the Army, General Ferguson urged SAMSO to exploit this new opportunity to reverse the bias by submitting an attractive program to ARPA.[8]

[redacted] On 1 March 1968, SAMSO forwarded its Area Ballistic Missile Defense Master Plan describing three promising systems for missile defense. Of the three systems, the first was designed to provide a defense in depth against a USSR/nth country 1972-1975 threat. It would consist of five elements:[9]

1. A synchronous satellite net to provide boost phase observation for threat assessment and trajectory prediction

2. A ground-based radar for long-range observation and threat cloud mapping during boost and midcourse phases, to complement and update data from the satellite and balloon elements.

3. A high altitude balloon system, to complement both the preceding elements

4. A Minuteman booster

5. A terminal interceptor system

[redacted] System B was designed to provide a mobile ICBM defense system to complement Sentinel in defense of the continental United States or be deployed for defense of allies. It would include:

1. An aircraft element as a platform for target acquisition, tracking, and interceptor systems

2. A post-boost tracking (PBT) satellite, for threat cloud mapping and trajectory prediction of threat clouds in midcourse

3. An acquisition and tracking element consisting of a precision acquisition radar system and/or optical systems, i.e., laser and LWIR

4. An air-launched interceptor, with nonnuclear kill capability, to intercept threat clouds

5. A balloon and threat mapping radar system element similar to System A

[redacted] System C, designed to counter the 1976-1980 USSR/nth country threat, would include:

1. An improved boost phase observation satellite and ground-based radar element (relative to System A)

2. A high altitude balloon system to perform threat cloud mapping and trajectory prediction during midcourse, complementing and verifying PBT satellite and radar data

[redacted]

3. A satellite system element, for single or multiple-observation of boost phase, to predict trajectories and launch small, multiple homing interceptors

SAMSO advised that it would describe each system in more detail, after it had completed further study and analysis.

[redacted] Other efforts were under way to define an Air Force missile defense system. On 27 December 1967, after reviewing a series of presentations on the general state of ballistic missile defense within DOD, the Chief of Staff approved formation of an action group to develop a Coordinated Action Plan* in support of Air Force objectives in ballistic missile defense. The group was to review existing and planned Air Force systems which could contribute to development of an area ballistic missile defense. After several months of work, the group completed the plan now identified as the Missile and Space Defense CAP, and presented it to the Air Force board structure in May and June.[10]

[redacted] Concurrently with the preparation of the CAP, a Ballistic Missile Defense white paper was being processed through the staff. Both documents discussed weaknesses and limitations of the Sentinel system and documented the case for the Air Force seeking a role in missile and space defense. Both, however, accepted the fact that Sentinel had progressed to the point where it was futile to advocate its total replacement by an Air Force system. Nevertheless, somewhere along the line USAF officials felt it essential to submit a proposal for OSD consideration. The white paper suggested that the most appropriate USAF system to supplement the Army's Sentinel might be a Minuteman II/[redacted] Such a proposal might be the catalyst needed to produce an OSD reevaluation of the

*The key purpose of a Coordinated Action Plan was to define and time-relate specific Air Force actions that needed to be taken and to identify agencies responsible for these actions. The CAP concept was designed to complement and support Air Staff functions and provide a comprehensive plan of action that would increase the probability of achieving Air Force goals.

[redacted]

Sentinel decision. While emphasizing Minuteman as the key to an Air Force missile defense role, the white paper also identified other Air Force systems and technologies, including those related to space, which could contribute. It especially advocated continuing analysis of the Airborne Ballistic Missile Intercept System.[11]

[redacted] The Coordinated Action Plan expanded on the Minuteman concept, proposing a mix of Sentinel and Minuteman II intercept missiles with the nonnuclear terminal homing vehicle based on [redacted] technology. The CAP was less enthusiastic about airborne interception. At the end of June 1968, these Air Staff documents on the Air Force potential for ballistic missile and space defense were awaiting Chief of Staff and Secretary of the Air Force approval.

NOTES

Chapter VI

1. Gerald T. Cantwell, The Air Force in Space, Fiscal Year 1967 [redacted] (AFCHO, 1970), Pt II, pp 12-14; ltr ([redacted], Col Victor M. White, Prog 461 Dir., SSD, to CINCLANT, subj: Term of USAF Prog 461 Spt, 5 Dec 67; SAMSO Mgt Summary ([redacted], subj: Prog 641, 15 Dec 67.

2. Col White ltr, cited above.

3. Cantwell, FY 1967, Pt II, pp 15-18.

4. Secretary Brown's testimony, 26 Feb 68, before House Cmte on Appns, 90th Cong, 2d Sess, DOD Appns for 1969, Pt I, p 252; Cantwell, FY 1967, Part II, pp 27-28ff.

5. Msg ([redacted], AFRDSC 83728, Hedrick to AFSC, subj: Prog 949, 11 Aug 67; msg ([redacted], AFRDSC 86896, to AFSC et al, subj: Prog 949; msg ([redacted], AFRDSC 83728, Hedrick to AFSC et al, subj: Prog 949, 14 Aug 67.

6. Msg ([redacted], ESSLG 25830, ESD to AFSC, subj: 440L Det Cpbl, 21 Aug 67; msg ([redacted], AFRDDD 87276, Brig. Gen. Leo A. Kiley, to AFSC, subj: 440L Det Cpbl, 31 Aug 67; msg ([redacted], AFRDDD 85038, Kiley to AFSC, subj: 440L Det Cpbl, 18 Aug 67; rprt ([redacted], Jt Space Pnl 67-10, AD Pnl 67-14, Strat Pnl 67-35, 13 Sep 67.

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11. Memo ([redacted]), Brown to SECDEF, subj: ([redacted] Rkt Launch and Nuc Burst Survl from Space, w/atch, 7 Nov 67.

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13. Memo ([redacted]), Nitze to SA & SAF, subj: 11 Jan 68.

14. Ltr ([redacted]), Hedrick to AFSC, subj: 28 Feb 68.

15. Memo ([redacted]), Flax to DDR&E, subj: DCP for 12 Feb 68; memo ([redacted]), Foster to SAF, subj: DCP, 6 Apr 68.

16. Ibid.

17. Hist ([redacted]), Dir/Space, Jan-Jun 68, pp 58-62; ltr ([redacted]), Holzapple to Asst SAF (R&D), subj: [redacted] Gnd Gdnc Stn, 8 Apr 68.

18. Memo ([redacted]), Yarymovych to Dir/Space, subj: Actions, 10 May 68; memo ([redacted]), Yarymovych to Dir/Space, subj: [redacted] Activities, 27 May 68.

19. Ltr ([redacted]), McConnell to Ferguson, subj: Msn Anlys on SOS, 5 Feb 68; ltr ([redacted]), McConnell to OSAF, subj: Msn Anlys on SOS, 5 Feb 68.

20. Rprt ([redacted]), Jt AD Pnl 68-14, Strat Pnl 68-23, Space Pnl 68-12 Mtg, 7 Jun 68; ltr ([redacted]), Hedrick to AFSC West Coast Study Gp, subj: SOS-70's, 21 May 68; AFSC White Paper ([redacted]), subj: SOS-70's, 17 Jun 68.

21. Ibid.

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Chapter VII

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9. ABMD Master Plan ([redacted]), SAMSO, 11 Dec 67 (rev 1 Mar 68).

[redacted]

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GLOSSARY OF TERMS AND ABBREVIATIONS

ABM	antiballistic missile
ADC	Aerospace Defense Command
AEC	Atomic Energy Commission
AFEO	Air Force Eyes Only
AFSC	Air Force Systems Command
anlys	analysis
ARPA	Advanced Research Projects Agency
BMEWS	Ballistic Missile Early Warning System
CAP	Coordinated Action Plan
Comdr	Commander
DCP	Development Concept Paper
DCS	Deputy Chief of Staff
def	defense
det	detachment/detection
dev	development
DEW	distant early warning
Dir	Director
DOD	Deparlment of Defense
ESD	Electronic Systems Division
FOBS	fractional orbital bombardment system
Gnd	ground
HASP	High Altitude Surveillance Platform
ICBM	intercontinental ballistic missile
JCS	Joint Chiefs of Staff

LASP	Low Altitude Surveillance Platform
Ltr	letter
LWIR	long wave infrared
mgt	management
msg	message
msn	mission
mtg	meeting
NM	nautical mile
ODDR&E	Office of the Director of Defense Research and Engineering
OSD	Office of the Secretary of Defense
OTH	over-the-horizon
PBT	post boost tracking
Pnl	panel
Prog	program
Pt	part
R&D	research and development
Rkt	rocket
Rprt	report
SA	Secretary of the Army
SAC	Strategic Air Command
SAF	Secretary of the Air Force
SAMSO	Space and Missile Systems Organization
sat	satellite
SECDEF	Secretary of Defense
SLBM	sea launched ballistic missile
Spt	support
sys	system
Trng	training
Vela	nuclear detection satellite